<u>What is claimed is:</u>

1. A method of searching for clustering imperfect entities, comprising:

entering data on imperfect entities present in a search target;

calculating a frequency distribution of the imperfect entities in unit cells divided from the search target;

approximating the frequency distribution by overlaying at least two discrete distribution functions; and

searching for clustering imperfect entities according to weights of the discrete distribution functions on the frequency distribution.

2. The method of claim 1, wherein:

entering data on imperfect entities comprises entering the number of imperfect entities in each of the unit cells and entering criterial conditions for the weights of the discrete distribution functions; and

searching for clustering imperfect entities comprises searching for clustering imperfect entities according to the criterial conditions.

3. The method of claim 2, wherein:

the discrete distribution functions include a Poisson distribution and a negative binomial distribution;

entering criterial conditions comprises entering a threshold weight to test the weight of the negative binomial distribution on the frequency distribution; and

searching for clustering imperfect entities comprises determining the presence of clustering imperfect entities if the weight of the negative binomial distribution is greater than the threshold weight and no presence of clustering imperfect entities if the weight of the negative binomial distribution is equal to or smaller than the threshold weight.

4. The method of claim 2, wherein entering data on imperfect entities includes:

detecting imperfect entities present in the search target;

storing coordinates of the detected imperfect entities; and

converting the coordinates of the detected imperfect entities into the numbers of imperfect entities in the unit cells divided from the search target.

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5. The method of claim 1, wherein:

entering data on imperfect entities comprises entering the numbers of imperfect entities present in the unit cells divided from the search target and coordinates of the unit cells on the search target; and

searching for clustering imperfect entities comprises calculating, as a clustering faults threshold, the number of imperfect entities that equalizes components of the discrete distribution functions with each other and searching for every unit cell involving imperfect entities whose number is greater than the clustering faults threshold.

6. The method of claim 5, wherein:

the discrete distribution functions include a Poisson distribution and a negative binomial distribution; and

calculating a clustering faults threshold comprises calculating the number of imperfect entities that equalizes components of the Poisson distribution with components of the negative binomial distribution.

7. The method of claim 5, wherein entering data on imperfect entities includes:

detecting imperfect entities present in the search target;

storing coordinates of the detected imperfect entities; and

converting the coordinates of the detected imperfect entities into the numbers of imperfect entities in the unit cells divided from the search target and coordinates of the unit cells.

8. The method of claim 1, wherein the imperfect entities include electrical faults.

9. The method of claim 1, wherein the imperfect entities include defects.

10. An apparatus for searching for clustering imperfect entities, comprising:

an input unit entering data on imperfect entities present in a search target;

a frequency distribution calculator calculating, according to the entered data, a frequency distribution of the imperfect entities in unit cells divided from the search target;

a discrete distribution function calculator approximating the frequency distribution by overlaying at least two discrete distribution functions; and

a clustering faults searcher searching for clustering imperfect entities according to weights of the discrete distribution functions on the frequency distribution.

11.   The apparatus of claim 10, wherein:

the data on imperfect entities include the number of imperfect entities in each of the unit cells and criterial conditions for the weights of the discrete distribution functions; and

the clustering faults searcher searches for clustering imperfect entities according to the criterial conditions.

12.   The apparatus of claim 10, wherein:

the data on imperfect entities include the numbers of imperfect entities present in the unit cells divided from the search target and coordinates of the unit cells on the search target; and

the clustering faults searcher comprises a clustering faults threshold calculator to calculate, as a clustering faults threshold, the number of imperfect entities that equalizes components of the discrete distribution functions with each other, and a location searcher to search for every unit cell involving imperfect entities whose number is greater than the clustering faults threshold.

13.   A program executable by computer, comprising:

entering data on imperfect entities present in a search target;

calculating a frequency distribution of the imperfect entities in unit cells divided from the search target;

approximating the frequency distribution by overlaying at least two discrete distribution functions; and

searching for clustering imperfect entities according to weights of the discrete distribution functions on the frequency distribution.

14.   A method of optimizing redundant circuits, comprising:

entering the number of redundant circuits required to repaired faults in chips divided from a wafer;

calculating a frequency distribution of the redundant circuits on the chips; and

calculating an optimum number of redundant circuits that maximizes the number of acceptable chips producible from the wafer according to a relationship between the number of redundant circuits and the number of acceptable chips producible from the wafer.

15. A method of managing processes, comprising:

taking one of search targets;

entering data on imperfect entities present in the taken search target;

calculating a frequency distribution of the imperfect entities in unit cells divided from the taken search target;

approximating the frequency distribution by overlaying at least two discrete distribution functions;

searching for clustering imperfect entities according to weights of the discrete distribution functions on the frequency distribution; and

repeating these acts on each of the search targets.

16. A method of managing a clean room, comprising, in an imperfect-entity testing process carried out in the clean room:

entering data on imperfect entities present in a search target;

calculating a frequency distribution of the imperfect entities in unit cells divided from the search target;

approximating the frequency distribution by overlaying at least two discrete distribution functions; and

searching for clustering imperfect entities according to weights of the discrete distribution functions on the frequency distribution.

17. A method of manufacturing semiconductor devices, comprising, in an imperfect-entity testing process taking place in semiconductor device manufacturing:

entering data on imperfect entities present in a search target;

calculating a frequency distribution of the imperfect entities in unit cells divided from the search target;

approximating the frequency distribution by overlaying at least two discrete distribution functions; and

searching for clustering imperfect entities according to weights of the discrete distribution functions on the frequency distribution.

18. A method of identifying problematic processes and equipment, comprising:

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taking one of search targets;

entering data on imperfect entities present in the taken search target;

calculating a frequency distribution of the imperfect entities in unit cells divided from the search target;

5   approximating the frequency distribution by overlaying at least two discrete distribution functions and calculating weights of the discrete distribution functions;

repeating the above acts on each of the search targets;

calculating, equipment by equipment for each process, a frequency distribution of the discrete-distribution-function weights according to the calculated weights and equipment history of

10   each search target;

calculating, for each process, a difference between the frequency distributions of the discrete-distribution-function weights calculated equipment by equipment; and

extracting processes and equipment related to the calculated differences in descending order of the calculated differences.

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19.   The method of claim 18, wherein the imperfect entities are redundant circuits to repair faults in the search targets.

20.   A program executable by computer, comprising:

20   taking one of search targets;

entering data on imperfect entities present in the taken search target;

calculating a frequency distribution of the imperfect entities in unit cells divided from the search target;

approximating the frequency distribution by overlaying at least two discrete distribution

25   functions and calculating weights of the discrete distribution functions;

repeating the above acts on each of the search targets;

calculating, equipment by equipment for each process, a frequency distribution of the discrete-distribution-function weights according to the calculated weights and equipment history of each search target;

30   calculating, for each process, a difference between the frequency distributions of the discrete-distribution-function weights calculated equipment by equipment; and

extracting processes and equipment related to the calculated differences in descending order of the calculated differences.

21. An apparatus for identifying a problematic process and equipment, comprising:

a data memory at least storing data on imperfect entities present in search targets each divided into unit cells and equipment history showing the search targets and processes and equipment that processed the search targets;

a frequency distribution calculator calculating, for each of the search targets according to the data on imperfect entities, a frequency distribution of imperfect entities in the unit cells of the search target;

a discrete distribution function calculator approximating each of the frequency distributions by overlaying at least two discrete distribution functions and calculating weights of the discrete distribution functions;

a weight frequency distribution calculator calculating, equipment by equipment for each process, a frequency distribution of the discrete-distribution-function weights according to the calculated weights and the equipment history; and

a difference calculator calculating, for each process, a difference between the frequency distributions of the discrete-distribution-function weights calculated equipment by equipment.

22. A method of determining whether or not a search target must be scrapped, comprising:

evaluating, in a testing process in semiconductor device manufacturing, the characteristics of semiconductor elements on the search target and detecting imperfect entities present in the search target;

calculating a frequency distribution of the imperfect entities in unit cells divided from the search target;

approximating the frequency distribution by overlaying at least two discrete distribution functions and calculating parameters related to the discrete distribution functions;

calculating a yield of the search target according to the calculated parameters; and

determining, according to the yield, whether or not the search target must be scrapped.